

# Mobile Device and Web Based Remote Controller on Data Repository

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## Abstract

The goal of this paper is to present an application in mobile devices or client PC which allows data (documents, multimedia etc) from remote computer or server machine to send it to the nearest printer or fax machine. The user can browse large data repository by passing only the command from the mobile device to the remote computer while looking at only the name of files, summaries, or full documents. Once selected, data can be forwarded to any email address or fax machine for full viewing. The remote controller (Mobile Device) can be extended to add web access or email access. The Apache Hyper Text Transfer Protocol (HTTP) Server, commonly referred to simply as Apache IPA as a web server, is in utilization. The console of a remote control service, a Java application, is accessed simply through a Web browser. And also Hypertext Preprocessor (PHP) is used to build up the mail function. The total system is implemented and tested in software platform. The observation shows its proper functionalities.

## Keywords

*Mobile Device; PDA; Remote Controller; J2ME; Mobile Browser; Mail Function*

## Introduction

The use of mobile phones in everyday life has reached tremendous level. Statistics show that, till March, 2004, there was 1,050,400,000 mobile phone users all over the world and it was predicted that this number will increase to 1,108,200,000 in June 2006 [1]. With the development of technology in network, remote control technology gradually occupying the technology mainstream has become more and more popular in home, office and distance education. The rapid development provides a huge room of research in remote control software. Pcanywhere, damewhere, QQ remote assistance, and other remote-control software have emerged. In remote control, improving efficiency and ensuring accuracy of the transmission are paramount to evaluate the success of remote

control software [4]. Remote control over the internet is a popular research topic. Various Internet-based remote control systems are proposed [6]. Many research have been done on remote control system to access data from a remote device. A novel design, has been proposed in paper [2], titled Web-based remote control service (WBRCS) system in which it is claimed that the design can simultaneously contain and provide many remote control services through which any person is able to control simply using a Web browser alone with any pre-registered device in the Internet. In paper [4] a remote control system is shown making the focuses on intercepting the control and the images, and TCP-stick packages. In addition, an intelligent web user interface (IWUI) service supported by a Web Service-based Remote Control Service System (WSRCSS) proposed in paper [6], can generate a design according to the user and control task needs. Paper [7] presents the user interface and the system architecture of an Internet-based tele-laboratory, which allows researchers and students to remotely control and program two educational online robots. The paper [10] introduces CANINSIGHT developed to create a device and platform independent field bus management system for highly distributed enterprises using CAN open Markup Language (CoML) which is an XML application for Controller Area Network (CAN), and also shows that it is possible to use standard database clients to request specific CoML information which can be processed either by dedicated CoML tools or a wide variety of general purpose XML tools. Paper [11] proposes an intelligent multimodal architecture to provide access to business data anywhere, anytime inline with the vision to make Mauritius a cyber paradise.

In this paper an application has been proposed in mobile devices such as PDA or mobile phones that

allow retrieving data (documents, multimedia etc) from computer or server to send it remotely to the email address or the nearest printer or fax machine. The user can browse through large data repository by looking at only the name of files, summaries, or full documents. Once selected, data can be forwarded to any email address or fax machine for full viewing. We design an interface among different devices and data access components in back-end computers. When PowerPoint files for the presentation inaccessible at that time, mobile phone can be applied to look through the file repository, then sent to any printer nearby or email to the meeting organizer.

### Used Technology

In the development of a new system, the proven cost effective WAP (Windows-Apache-PHP) platform has been chosen. PHP is an open source scripting language which offers huge collections of built-in routines required to rapidly develop the system. Though PHP lacks some features demanded by team development approach, third party tools are helpful to overcome the limitations. Therefore a simple application by requirements and coverage, development of the new system can be housed perfectly on the chosen platform of PHP.

### Web Server

The term “web server” means: (1) A computer program that is responsible for receiving HTTP requests from *clients* (user agents such as web browsers), and serving them HTTP responses along with optional data contents, which usually are web pages such as HTML documents and linked objects (images, etc.). (2) A machine that runs a computer program as described above. The Apache HTTP Server, commonly referred to simply as Apache IPA is employed as a web server. Apache supports a variety of features, many implemented as compiled modules which extend the core functionality. perfectly on the chosen platform of PHP.

### PHP

A mail function is design to retrieve data from the remote PC. Here Hypertext Preprocessor (PHP) is used for the design. We choose PHP for the excellent features of it. PHP, a widely-used general-purpose scripting language that is especially suited for web development, can be embedded into HTML and generally runs on a web server, taking PHP code as its input and creating web pages as output. It can be

deployed on most web servers and on almost every operating system and platform free of charge.

### Lava Scripts

At the client side, mobile device is used to retrieve data from the server (back end computer). JavaScript is used as a client side program. The j2me (JAVA Mini) is used as a scripting language to enable programmatic access to objects within the remote PC through the mail function.

### Implementation

This work mainly focuses on the file retrieved from a PC with the help of hand hold device (Mobile Phone) through a mobile network or internet. The overall block diagram of this work is presented in the following Fig. 1. Here the first block is the browsing device by which the client can browse all the files stored on the personal computer or server. Using the conventional network connection the client can communicate with the PC as well as send the required file to the email account or fax machine for full viewing. Finally one can print the documents by a network printer. The implementation details are explained in the following subsections.

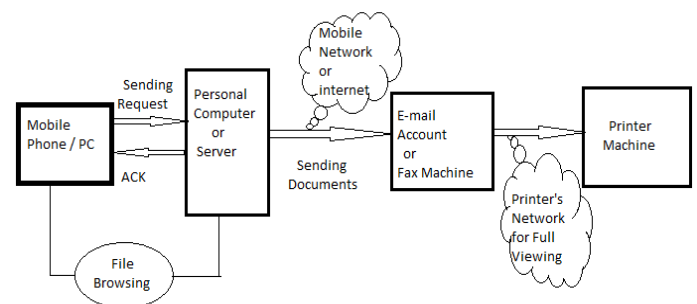


FIG. 1 BLOCK DIAGRAM OF THE MOBILE DEVICE AND WEB BASED REMOTE CONTROLLER

### Directory Service

Interfaces can communicate with mobile phone and computer and have the directories structure of back end computer which can be viewed by the mobile phone and the file can be transferred to the email address as specified. The directory service we implemented in two ways. We used the java script language to show the directory service of back end computers. Another way that the directory service can be viewed is by writing a simple mail functions in PHP at the back end computers. So only the command will be passed from the client machine to the server machine and activated the mail function at the back

end computer. The graphical representation of directory service is provided by Fig. 2 and Fig. 3.



FIG. 2 DIRECTORY OF SERVER MACHINE



FIG. 3 FILES RETRIEVING WINDOW

So if we implement the directory structure by java script then an extra mail transfer program is required to transfer the files to an email address.

### Mail Function

The mail function is a PHP code that can browse the data from the back end computer and can send email to the given address. Fig. 4, 5, 6 and 7 are provided in a sequence. There are some fields included in the panel including To, Cc, Bcc, From, Reply-To, Attachment, Type, Encoding, Character set, Subject and Comments. By the attachment field we can browse all the text, HTML files from the back end computer.

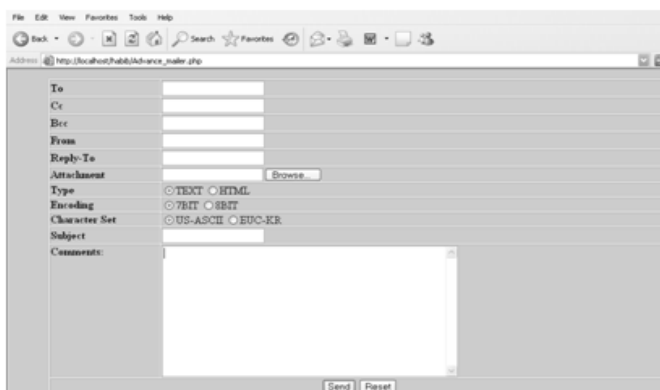


FIG. 4 SENDING WINDOW OF MAIL FUNCTION

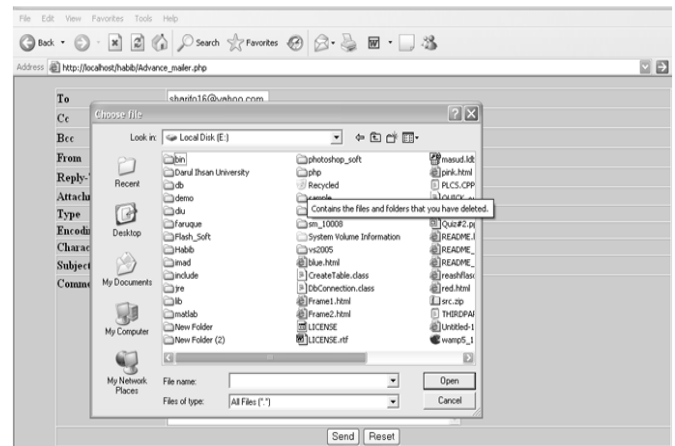


FIG. 5 DIRECTORY WINDOW FOR FILE BROWSING

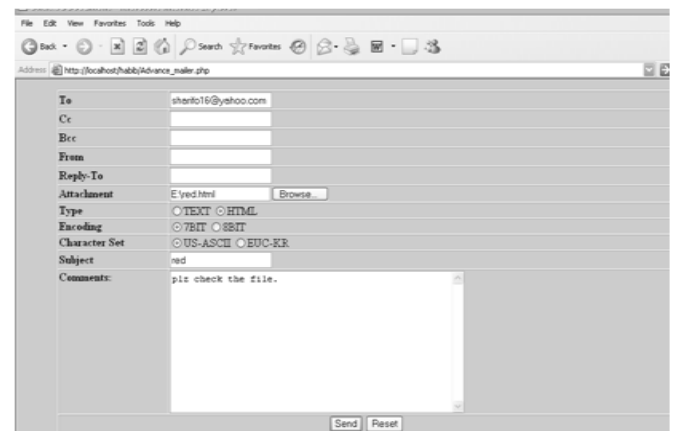


FIG. 6 FILE ATTACHMENT AND SENDING WINDOW

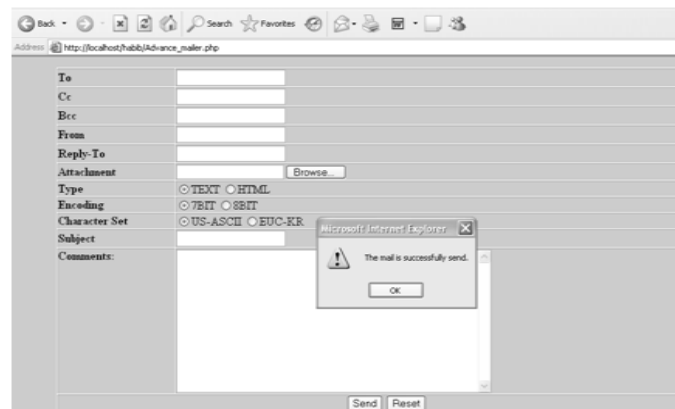


FIG. 7 ACKNOWLEDGEMENT WINDOW

### File Transfer

In the file transfer process passing the command from a remote machine to the back end computers and getting reply the acknowledgement from the server side is implemented. Client machine just passes the command to the directory service of the server pc which is indicated in Fig. 8. File can be transferred from client pc to server pc and vice versa. The whole process can be treated as file transfer protocol using the socket programming.

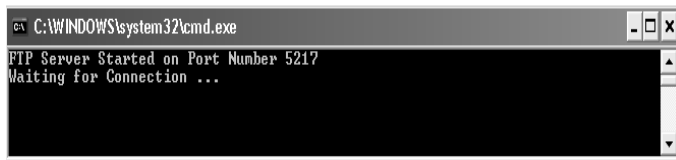


FIG. 8 FTP SERVER ON PORT 5217



FIG. 9 CLIENT REQUEST

When the server is on then the server is waiting for connection from the client side. In the Figure 9 the client program contains a menu option which has three options to send file, receive file or exit. That means the client can either send or receive the file to or from any pc.

### Web Server

A web page will be uploaded in the gate way server machine whose function is to provide the gate way service. As the remote machine does not know the local IP of any machine in the network, a server of real IP is needed. Thus the web page will be stored to the server which communicates the local host using its routing table. While the server communicates the local host, it serves as a client and the host pc serve as a server. An apache server will be started at both the server and client to transmit data.

### Mobile Browser

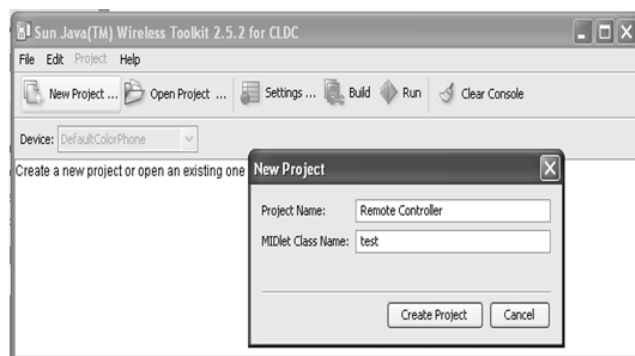


FIG. 10 NEW PROJECT WINDOW STARTING BY J2ME

Remote controller for this work, the mobile phone is in consideration. If the mobile browser is not available, there will be another way to implement the project.

Then a simple j2me program will be established for mobile browser in the mobile phone. Fig. 10, 11, and 12 show the mobile phone browser window implemented by j2me Midlet program.

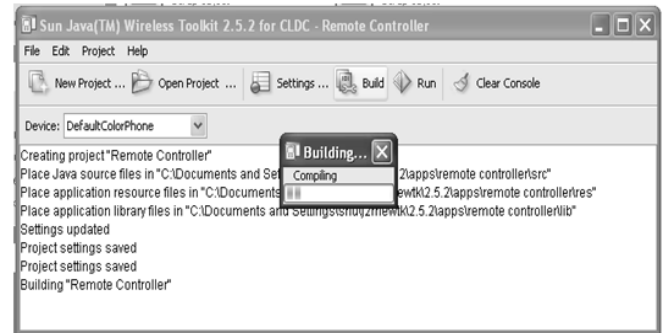


FIG. 11 COMPILING WINDOW



FIG. 12 MOBILE PHONE BROWSER WINDOW

## Interface Requirements

### User Interfaces

The logical characteristics of each interface between the software product and the users are to be users friendly to an extent so that users of deferent expertise level starting to naive can use it. All GUI are developed on HTML and J2SE.

### Hardware Interfaces

This may include the supported device types like

- Pentium IV or same level processor.
- 128 or more cache memory.
- 1 GB RAM.
- 80 GB hard drive.
- Colour monitor.
- CD ROM Drive.
- Keyboard and mouse.
- Printer.
- Stabilizer or UPS.

## Software Interfaces

The software interfaces are following:

- Operating system :Windows XP Professional 2000
- Macromedia Studio MX for Authoring of web material.
- JSP/ Servlet Programming/ Java Programming, PHP Triad and Wireless Tool Kit for implementing this work.
- XML and HTML expert for designing web page.
- Apache server.
- Sending mail program in PHP mail function.

## Communication Interfaces

The application should be supported by any of the web browser like Internet Explorer or MOZILA FIREFOX for desktop computer and mobile browser, net server communication protocol HTTP. To communicate with the local pc without real IP, gate way should be contained which has real IP.

## Conclusions

The technologies of PDA, digital cellular phone and web application, when combined and integrated well, have the potential of replacing all of the things people have to carry around with by one small device, the Pocket Companion, a small portable computer and wireless communications device that can perform wide range of activities. The combination of a web based and remote controlling system engenders many new types of applications, such as data repository control, paging, and an automatic diary that keeps track of the information where you are and with whom. In the first phase of this work, a small set of applications was implemented to evaluate our solutions to a number of key problems and the potential of the system has been revealed. The knowledge obtained from this phase will be used in the possible second phase of the project to design a system capable to deal with more demanding applications. Moreover, the demonstration of the applications at the end of the first phase will be a powerful instrument to get some organizational involvement.

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